Real Estate Math Workbook

President: Dr. Andrew Temte
Chief Learning Officer: Dr. Tim Smaby
Executive Director, Real Estate Education: Melissa Kleeman-Moy
Development Editor: Jody Manderfeld

REAL ESTATE MATH WORKBOOK

Published by DF Institute, Inc., d/b/a Kaplan Real Estate Education
332 Front St. S., Suite 501
La Crosse, WI 54601

Printed in the United States of America

ISBN: 0-X320-0529-6
PPN: 3200-5296

CONTENTS

UNIT **ONE** COMMISSION AND NET TO SELLER 1

UNIT **TWO** VALUE AND RATE OF RETURN, DEPRECIATION, AND CLOSING MATH 5

UNIT **THREE** LOAN, MEASUREMENT, AND PROPERTY TAX MATH 15

UNIT 1

COMMISSION AND NET TO SELLER

I. DETERMINING A COMMISSION

Objective:

Accurately compute the commission a seller will pay the listing broker upon the sale of a property, given a commission rate and a sales price.

Example 1:

A seller agreed to pay a 6% commission on the home she listed with a broker. The home sold for $80,000. How much was the commission?

Example 2:

The commission received was $4,800 and the rate was 6%. What was the sales price?

II. DETERMINING COMMISSION SPLITS

Objective:

Calculate commission splits between brokerage firms.

Example:

A salesperson whose license is held by ABC brokerage has sold a house for $100,000. The salesperson and the seller had a listing agreement stating that the commission would be 6% of the sales price of the house. The listing agreement also stated that the 6% was to be split equally between the listing brokerage (ABC) and any brokerage that brought a buyer. How much does each brokerage get paid when the transaction closes?

III. DETERMINING COMMISSION WHEN RATE IS NOT GIVEN

Objective:

Find the total commission from the known sales price and the commission earned by one brokerage.

Example:

The sales price of a home was $100,000. The commission was split 50-50 between the listing brokerage and the buyer's brokerage. If the listing brokerage received $3,000, what was the total commission?

What if the split was 60-40, with 60% going to the listing brokerage?

IV. DETERMINING THE SELLER'S NET FROM SALE

Objective:

Compute the seller's net proceeds from the sale of the property.

Example:

A seller sold her home for $150,000. She had an existing mortgage of $75,000 and paid $1,800 in closing costs plus a 6% commission. What was the seller's net proceeds from the sale?

V. DETERMINING THE SALES PRICE NEEDED TO GET A CERTAIN SELLER'S NET

Objective:

Calculate the sales price required to net the seller's desired proceeds from the sale of a property.

Example:

An owner agrees to list on the condition that the net from the sale is at least $110,000 after $8,000 for fix-up and closing costs and a 5% commission. What minimum selling price is required for the property?

UNIT 2

VALUE AND RATE OF RETURN, DEPRECIATION, AND CLOSING MATH

I. VALUE AND RATE OF RETURN

Objective:

Calculate the amount a property has appreciated or depreciated in value, and determine a rate of return.

Example 1:

A property was purchased five years ago for $300,000. It has appreciated 15%. What is the current value of the property?

Example 2:

An investor receives a monthly income of $1,200 from an investment of $169,000. What was the investor's rate of return?

II. DETERMINING NET OPERATING INCOME (NOI)

Objective:

Determine the net operating income (NOI) for an income property.

Example:

A building has the potential to generate $105,000 in gross rental income each year. Vacancies and bad debt total $5,000. The building has $40,000 in annual operating expenses. The annual mortgage payment totals $38,000. The owner installed new windows for $10,000. What is the NOI for the property?

III. INVESTMENT CAPITALIZATION (INCOME APPROACH)

Objective:

Calculate the capitalization rate of an investment and demonstrate the relationship between capitalization rate, income, and value.

Example 1:

If a property's annual net income is $10,000 and the investor desires a capitalization rate of 10%, what would the investor be willing to pay?

Example 2:

An investor offers $400,000 for a property and expects a capitalization rate of 6%. What is the net operating income?

Example 3:

The net operating income for a property is $18,000. An investor offered $300,000 for it. What is the capitalization rate?

IV. PROPERTY MANAGEMENT CALCULATIONS

Objective:

Identify how a property manager uses capitalization to determine property values and calculate NOI when given all income factors.

Example:

A property manager's building currently generates annual net operating income of $125,000. The manager needs to make some budget decisions and has to estimate the impact of those decisions on the value of the building. If the market capitalization rate is 10%, what is the building value?

V. GROSS RENT MULTIPLIER

Objective:

Calculate the gross rent multiplier of an investment and demonstrate the relationship between the gross rent multiplier, income, and value.

Example 1:

The monthly gross rent multiplier in the area is 120. If the annual rent is $12,000, what is the value?

Example 2:

Estimate the monthly rent needed for a building to be valued at $120,000 in an area where the monthly gross rent multiplier is 120.

Example 3:

If a building is valued at $120,000 and the annual rent is $12,000, find the monthly GRM.

VI. STRAIGHT-LINE DEPRECIATION

Objective:

Accurately calculate straight-line depreciation.

Example 1:

A building is valued at $390,000. The depreciation period is 39 years. What is the allowed depreciation per year?

How much depreciation has the owner been allowed to claim over 8 years?

Example 2:

Consider a building that was purchased for $390,000 and has a 39-year depreciation period. What is the annual straight-line depreciation expressed as a percentage?

VII. PRORATIONS

Objective:

Explain what items are prorated at closing, and demonstrate how to solve a simple proration problem.

Example:

An investment property is scheduled to close on June 20. The seller owns the day of closing. The $60 water bill for the month was paid in advance. How will the water bill be prorated at closing?

VIII. TAX PRORATIONS

Objective:

Accurately prorate property taxes and interest paid in arrears for closing.

Example 1:

The unpaid annual taxes are $2,600. The closing date is August 30 and the seller is responsible to pay for the day of closing. Using a 365-day year, how would the proration be shown on the closing statement?

Example 2:

A buyer is obtaining a mortgage that has annual interest totaling $6,000, which is paid monthly and in arrears. How much will the buyer be debited at closing for prepaid interest owed for the month of January if the sale takes place January 10? The seller owns the day of closing. Use a 365-day year.

IX. OTHER PRORATIONS

Objective:

Accurately prorate HOA dues when paid in advance for closing.

Example:

An investment property transaction will close on June 20. The seller will own the day of closing. The monthly HOA dues were $210 and were paid in advance. How will they be prorated at closing?

UNIT 3

LOAN, MEASUREMENT, AND PROPERTY TAX MATH

I. INTEREST AND DOWN PAYMENT

Objective:

Compute down payment and simple interest on a real estate loan.

Example 1:

A borrower obtains a $300,000 loan at 6% interest. What is the borrower's annual interest?

Example 2:

A borrower obtains a $300,000 loan at 6% interest. What is the borrower's interest for the first month?

Example 3:

If the principal is $300,000, the interest rate is 6%, and the borrower's monthly payment is $1,650, how much of the payment is applied to the principal?

II. LOAN-TO-VALUE RATIO AND EQUITY

Objective:

Calculate the loan-to-value ratio (LTV) when given both a listing price and an appraised value.

Example:

A home appraises for $200,000. What is the loan-to-value ratio (LTV) if a buyer purchases the home for $200,000 with a $30,000 down payment?

III. DISCOUNT POINTS AND ORIGINATION FEES

Objective:

Calculate discount points and loan origination fees when given the loan value.

Example:

How much would a buyer pay in fees if a lender is charging 1.25 discount points and a 1% origination fee on a $200,000 loan?

IV. AMORTIZATION

Objective:

Demonstrate how to use an amortization chart to determine which payment would meet a borrower's objectives.

Example:

A buyer is obtaining a $165,000 loan at a 7% interest rate. If the buyer can afford a payment of $1,280 for principal and interest, what loan term will allow the buyer to pay off the loan in the shortest amount of time?

Use the loan factors (amortization) chart

Interest	15 years	20 years	25 years	30 years
6.00%	8.4386	7.1643	6.4430	5.9955
6.50%	8.7111	7.4557	6.7521	6.3207
7.00%	8.9883	7.7530	7.0678	6.6530
7.50%	9.2701	8.0559	7.3899	6.9921

V. QUALIFYING A BUYER

Objective:

Determine a buyer's qualifications using both front- and back-end loan ratios and the loan payment chart.

Example 1:

A couple who earns $4,950 per month after taxes wants to have a mortgage payment that is no more than 25% of their monthly earnings. Using the chart, determine the highest payment the couple can afford to pay on the $165,000 loan, and the terms associated with that payment.

Use the loan payment chart:

Interest	10 years	15 years	20 years	30 years
5.00%	$1,750.08	$1,304.81	$1,088.93	$885.76
5.25%	$1,770.31	$1,326.40	$1,111.84	$911.14
5.50%	$1,790.68	$1,348.19	$1,135.01	$936.85
5.75%	$1,811.19	$1,370.18	$1,158.44	$962.90
6.00%	$1,831.84	$1,392.36	$1,182.11	$989.26
6.25%	$1,852.62	$1,414.75	$1,206.03	$1,015.93
6.50%	$1,873.54	$1,437.33	$1,230.20	$1,042.91
6.75%	$1,894.60	$1,460.10	$1,254.60	$1,070.19
7.00%	$1,915.79	$1,483.07	$1,279.24	$1,097.75

Example 2:

A buyer purchased a home for $150,000 and applied for a 90% LTV-insured conventional loan at 7.5% interest with a 30-year term. The amortization factor is 6.99. What is the buyer's monthly payment of principal and interest?

VI. AREA CALCULATIONS

Objective:

Calculate the area and price per square foot of real property.

Example 1:

What is the area of a lot 70 feet by 200 feet?

What would this lot sell for at $3 per square foot plus a $20 premium per front foot?

Example 2:

A 2,000-square-foot property is listed for $200,000. What is the price per square foot?

The 2,000-square foot property eventually sold for $190,000. What was the price per square foot?

VII. ACREAGE AND LEGAL DESCRIPTIONS

Objective:

Calculate acreage from a rectangular government survey legal description.

Example:

How many acres are in the South East ¼ of the North West ¼ of section 7 in a 36-section township?

VIII. VOLUME

Objective:

Accurately calculate volume.

Example:

A warehouse measures 20 feet tall by 120 feet long by 80 feet wide. What is the volume of the warehouse in cubic feet?

IX. HOW TO CALCULATE ASSESSED VALUE

Objective:

Accurately calculate taxes, assessed value, or tax rate.

Example 1:

What is the assessed value of a property with an actual value of $425,000 when the state sets the assessment rate at 89%?

Example 2:

What are the annual property taxes on a property with an assessed value of $378,250 if the mill rate is 50?

Example 3:

What are the annual property taxes on a property with an assessed value of $378,250 if the tax rate is 5%?